WASHINGTON
SCIENCE TRENDS

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Helium Production Plans

U.S. Department of Interior has drafted new legislation which would permit private industry to finance, construct and operate plants to produce helium for sale to the Government, for conservation. Program calls for extraction and storage of helium from helium-rich gases before the gases are transported to fuel markets.

Ten years ago helium consumption in the U.S. came to 48.8 million cubic feet. This year's consumption is estimated at 375 million cubic feet. This sharp expansion of helium use in atomic energy, missile programs and other fields has intensified interest in additional helium production techniques and facilities. A preliminary attempt to bring industry into this Government-monopolized field foundered in the closing days of Congress last year. New legislation may also run into the difficulties of a crowded Congressional calendar.

Today, the U.S. Government uses directly about three-fourths of all helium produced by the Bureau of Mines. Of the remaining fourth, at least 65 percent goes into Government contracts. Not only is industry prevented from going into production, it also has difficulty in obtaining needed supplies, particularly in non-defense programs.

Among Government programs which promise increased supplies:

* New Production Plant - Bureau of Mines hopes to have its new plant at Keyes, Oklahoma completed in August with a production potential of 290 cubic feet of helium annually.

* Gas Wells - Four additional gas wells are being drilled and equipped in the Government-owned Cliffside Gas Field to increase the helium-bearing supply and production potential of plant at Amarillo, Texas.

* Plant expansion - Helium recovery and nitrogen removal low-temperature unit and related equipment will be installed at Amarillo to increase production capacity and improve marketability of residue gas. If feasible, a helium liquefaction unit will be installed, in accordance with studies demonstrating advantages and savings that might be realized in shipping helium in liquid form. At Exell, Texas, facilities will be modified to provide increased production capacity of some 75 to 100 million cubic feet per year.

SPECIAL REPORT - ENGINEERING AND OCEANOGRAPHY

National Academy of Sciences is making public details of the proposals to spend some $10 million a year over the next decade in the field of engineering for oceanographic research. Program calls for new deep manned and unmanned vehicles, aircraft, new instruments, new laboratory equipment and research into high seas engineering techniques.

Here is a summary of the varied proposals:

Deep Manned Vehicles

Report calls for a varied program by which conventional research ships can be supplemented with deep man-carrying submersibles. First goal is a new manned bathyscaph capable of operating down to at least 18,000 feet. A spherical shell with an internal diameter of 8 feet and a payload capacity of 2,000 pounds is proposed. An external arm and servo system is proposed so that operators can manipulate nets or instruments, adjust bottomed apparatus and pick up rocks or bottom living creatures. Construction of light weight steel, aluminum or similar alloys is suggested, with hulls as self-buoyant as possible. Design work is also suggested on a small, simple, mid-depth bathyscaph that can be handled like a lifeboat from a general purpose research ship.

Submarines -- "Within a short time," according to the report, "new construction submarines for research will be indespensible." It is urged that the Navy provide existing submarines or assist in the conversion of a submersible for civilian operation in the study of biological, acoustic, visual, turbulent, magnetic and other properties of the ocean.

Construction could begin now, the report states, on a small "reasonably conventional" mid-depth research submarine of a few hundred tons displacement with diesel battery power, a test depth of several thousand feet and the capability of staying at sea for about two weeks, with a range of 2,000 miles.

Large Manned Buoys

Manned buoys are proposed to provide deep water marine observatories which will permit continuous measurements over long periods at a number of fixed positions in the ocean. Initial buoys would be located in areas such as the Sargasso Sea, east of Puerto Rico or west of San Diego. It is suggested that eventually a network of such buoys will become a standard requirement for oceanographic and meteorological research, survey and prediction.

The plan calls for a manned spar buoy 300 to 1,000 feet in length extending at least from 30 feet above the surface to 300 feet below the surface. It would be ballasted to remain vertical and would be stable in pitch, roll and heave. Anchoring could be done with either steel, plastic or combination cables. Construction costs of a new unit are estimated at $2.5 million but an existing empty submarine hull might be employed.

Unmanned buoys at the surface, mid-depth or bottom are also proposed for the acquisition of synoptic data. The units can either record data or telemeter it to the surface by electrical cables or acoustic signals.

Aircraft

The oceanographers want aircraft for a variety of purposes. An aerial view of the ocean, they state, is often a valuable first step in studying a given region, since ocean currents, wind streaks, boundaries between water masses, surface temperature and marine life frequently can be seen, measured and contoured from the air. They propose the use of four engine piston-drive airplanes which may soon be replaced by jets on commercial and military transport runs. They would also like to have four bi-motored amphibians, eight, single engine utility planes, five helicopters equipped with wheels, skids and floats and they would also like to borrow a Navy blimp for trial purposes.

Specialized Ships

Work on modification of icebreakers, including a special arctic submarine, should "proceed immediately," the scientists state. They also point out that there are several highly specialized craft such as catamarans and hydrofoil boats which have attractive features for ocean studies.

New Instruments

More "creative instrumentation" is urged for oceanography. Meriting particular attention, it is stated, are such devices as permanent and expendable oceanographic instruments for aircraft; deep torpedoes; samplers and sensitive radioactivity measuring instruments; accurate, powerful and reliable acoustic telemetering devices; stable platforms to provide a relatively acceleration-free mount for gravity meters or precision weighing devices; current meters; direct density measuring devices; seismic equipment; turbulence measuring devices; cameras and underwater television.

Specialized Survey Instruments

Simple improvement of winches, the report states, might speed up an ocean survey as much as doubling the size of the ship's main propulsion plant. Needed immediately, it is stated, are new deep winches with electrical cables; precision salinometers; precision echo sounders; towed temperature recorders; magnetometers and smaller items such as standardized water-tight connectors.

High Seas Engineering

Extensive support and applied imagination is said to be required for new techniques in deep-sea drilling, dredging, coring, fish trapping, towing devices, photographic survey studies and similar projects.

Major Laboratory Equipment

Among major facilities said to be required are pressure facilities to study marine life and biological and chemical processes under conditions simulating the bottom of the ocean; data reduction systems, machine or card storage of data and instrumental aids to scientific literature search and analog computers, dynamic models and similar devices.

(Report Available -- See Publications Checklist)

RESEARCH CHECKLIST

( ) Fast Neutron Spectrometer; Researchers at the National Bureau of Standards have developed a fast-neutron spectrometer which is said to fill a long-time need for such an instrument in neutron physics. The device uses an hydrogenous scintillator in which a fast neutron may lose all energy, together with a detector for slow neutrons.

(Report Available. 25 Pages. 75 Cents. Write OTS, U.S.Department of Commerce, Washington 25, D.C. for NBS Technical Note No. 1)

( ) Air Pollution Research; U.S. Bureau of Mines experts have compiled estimated costs for building and operating various types of equipment to remove harmful sulfur dioxide from flue gases of powerplants. Marketable by-products from such an operation might include ammonium sulfate, sulfur and sulfuric acid.

(Report Available. Free. Write Publications-Distribution Section, Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa. for Report of Investigations No. 5469)

( ) Quantum Electronics: Office of Naval Research will sponsor an international conference at Bloomingburg, N.Y. Sept. 14-16, 1959 to consider basic problems in physics and electronics which are important to the increasing use of atomic and molecular resonances in masers, atomic clocks and related devices, as well as the general applications of "quantum electronics" to radioastronomy, high-resolution spectroscopy, and tests of relativity. Attendance at the "working conference" is limited to persons active in the field.

( ) Slurry Fuel Research: Studies by the former NACA indicate that magnesium-slurry fuels perform successfully when used in afterburners and ram jet engines but can only provide greater thrust than conventional hydrocarbon fuels, not increased range. The information gained in various tests may be applicable to the use of suspensions for other purposes.

(Report Available. Just Declassified. 24 pages. Free. Write Technical Information, NASA, Washington 25, D.C. for NACA Report No. 1338.)

( ) Electronic Translation Research: Research for the U.S. Patent Office has resulted in a special notation system for electronic processing of specialized letters, symbols and forms of type which are used in the texts of technical and scientific publications. Instructions for preparing a punched card deck, outlines of programs and samples of typical output are described in a new report.

(Report Available. 25 cents. Write Sales and Distribution Office, Room 6323, U.S. Department of Commerce, Washington 25, D.C. for "A Notation System for Transliterating Technical and Scientific Texts for use in Data Processing Systems.)

( ) Shock and Vibration Studies: Army is working on a means of measuring and recording shock and vibration phenomena so that they can be accurately analyzed in order to determine the effectiveness of shock isolation systems being used on fire control instruments. In this connection, two new accelerometer designs have been proposed. One is based on the piezo-resistive principle and the other on atomic radiation.

(R&D by Fire Control Laboratory, Fire Control Branch, Dev. Div. RAD Group, Frankford Arsenal, Philadelphia, Pa.)

( ) Instrumentation Development: Researchers at the Cornell Aeronautical Laboratory, Buffalo, N.Y. have devised a thin metal resistance thermometer up to 100 times more sensitive to temperature change than thin film thermocouples. The device is used to measure heat transfer rates in a hypersonic shock tunnel. Sensitivity may be varied at will by changing the energizing current in the element.

(Report Available. 73 pages. $2. Write OTS, U.S. Department of Commerce for PB 151 488)

( ) Particle Size Determination: The National Bureau of Standards now has available two standard samples of glass spheres which permit higher accuracy in the calibration of testing sieves. The sieves are used for checking particle size and distribution in foundries, petroleum laboratories, chemical firms and various industrial organizations.

(Further details available. Free. Write National Bureau of Standards, Office of Technical Information, Washington 25, D.C. for Summary Tech. Report No. 2368)

( ) Molybdenum Research; Navy is studying the deleterious effect of oxygen on the cold ductility and mechanical properties of molybdenum. The possibility of deoxidation with selected reducing agents such as thorium, yttrium, and other elements has been investigated with the aid of a new consumable electrode vacuum-arc melting furnace.

(R&D by Metallurgy Division, Nonferrous Alloys Branch, U.S. Naval Research Laboratory, Washington 25, D.C.)

( ) Low Pressure Measurements: Studies for the North Atlantic Treaty Organization indicate the need for new instrumentation for low-density aerodynamic investigations with wind tunnels. Various instruments for measurements of low gas pressures have been analyzed and a new method of design is proposed.

(Report Available. 30 pages. Free. Write NASA Technical Information, Washington 25, D.C. for AGARD Report No. 175)

Publications Checklist

( ) Engineering and Oceanography, the latest in a series of special reports on deep-sea research needs. 22 pages. Single copies free. (Write Information Office, National Academy of Sciences, Washington 25, D.C. for Oceanography Report No. 7)

( ) Arms Control, a summary and excerpts of unofficial and official proposals on the limitation of nuclear and missile weapons in Europe. 56 pages. Single copies free. (Write Subcommittee on Disarmament, Committee on Foreign Relations, Senate Office Building, The Capitol, Washington 25, D.C. for Handbook -- Arms Control)

( ) Aircraft Control Systems, discusses test procedures and instrumentation for automatic flight stabilization and control systems as developed by British engineers. 23 pages. Free. (Write NASA, Technical Information Division, Washington 25, D.C. for AGARD Report 192)

( ) Satellites, Lunar Probes and Space Probes, covers U.S. and Russian attempts from 1957 through March, 1959. Includes type, orbit weight, payload, lifetime, launching vehicle, instrumentation and other data in chart form. 9 pages. Free. (Write Information Office, NASA, 1520 H St., N.W., Washington 25,D.C. for Satellite Chart)

( ) The Perceptron, two reports on the "discriminating machine" hailed as the first step toward perfection of an electronic brain. PB 151 247, 272 pages, $4 covers design principles, electronic simulation of the brain and biological implications. PB 151-247 - S, 46 pages, $1.25 deals with the changes in the dynamics of the system which made the Perceptron "The first machine capable of having an original idea." (Order by Number from OTS, U.S. Department of Commerce, Washington 25, D.C.)

( ) Power Reactors, a new world directory of power reactors now in operation or under construction in various parts of the world. Designed to be a source of easy reference, either at the technical or management level. Periodic supplements are planned. $3.50. (Order from International Atomic Energy Agency, Vienna, Austria)

( ) Weather, Astronomy, Meteorology, a new catalog of Government publications in these fields. Just published. Free. (Write Public Documents Division, Government Printing Office, Washington 25, D.C. for Price List No. 48)

( ) Guided Missile Programs, a Library of Congress survey of U.S. and Russian missile programs as of January, 1959. Includes a selected reading list, charts and other material. 129 pages. Free, as available. (Write Committee on Armed Services, U.S. Senate, Washington 25, D.C.)

( ) Uranium Research, a catalog of U.S. Government Research Reports in the field of uranium alloys and compounds. Covers the period of 1936-1958. 14 pages. Free. (Write OTS, U.S. Department of Commerce, Washington, 25, D.C. for CTR 366 - Uranium Part II)

( ) Crystal Research, catalogs of technical reports covering germanium, selenium, silicon, crystals, including measurements, tests and equipment as well as quartz and other piezoelectric crystals. 26 pages. Free. (Write OTS, U.S. Department of Commerce For CTR 367 and 369)